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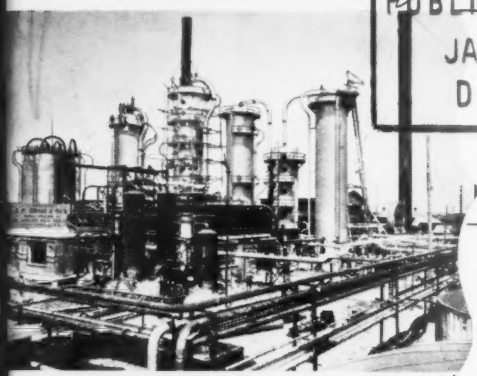

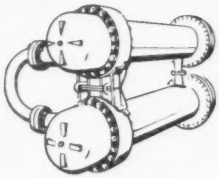

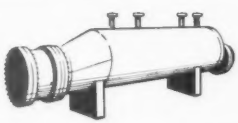

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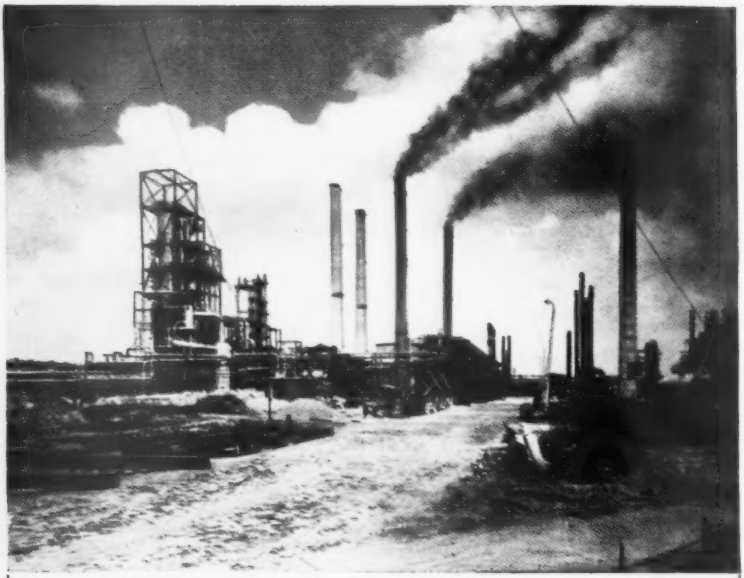

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CONTENTS

Modern Techniques in Petroleum Testing. V. Road Testing the Anti-Knock Quality of Motor Gasolines By H. J. Eatwell, M.B.E.	421	Council Commentary	431
Launch of S.T.S. "Velletia"	429	Around the Branches	432
		Trinidad Branch Dinner	434
		The CBMPE	438
		Forthcoming Meetings	446

MODERN TECHNIQUES IN PETROLEUM TESTING

V. ROAD TESTING THE ANTI-KNOCK QUALITY OF MOTOR GASOLINES

By H. J. EATWELL,* M.B.E. (*Associate Fellow*)

Introduction

The limitation of spark ignition engine efficiency by the incidence of knock or detonation is well known. Detonation in an engine is affected by its design, the conditions under which it operates and the chemical composition of the fuel used. The tendency of a fuel to knock is of great importance to the petroleum industry and to the users of petroleum products, the anti-knock quality of gasolines being continually under review by consumers as any failure to meet the requirement of a particular engine is immediately audibly apparent to them.

Recent publications[1, 2] have dealt with the laboratory test methods for the evaluation of this aspect of gasoline quality, and it is worthy of emphasis that any laboratory knock test method used for quality control of motor gasolines must correlate closely with the performance of fuels in vehicles on the road. To ensure this it is necessary to have available road test methods for the determination of fuel anti-knock quality on the road, and checks must be made from time to time to ensure that currently used laboratory methods are capable of reflecting the anti-knock quality of fuels in service.

Additionally it is apparent that any laboratory methods can only represent

*Anglo Iranian Oil Co. Ltd.

the performance of average fuels in the average car population. If it is desirable to know the road performance of a particular fuel in a selected car, then it is essential to make a road test in that car, for, as already stated, the road anti-knock performance of a fuel will depend on the design and operating conditions of the engine and the chemical composition of the fuel.

It is the purpose of this article to discuss the development of road anti-knock test techniques and their importance to both the petroleum and automobile industries in the light of current developments.

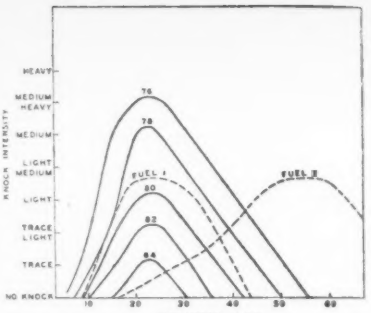

Fig. 1. Uniontown knock intensity curves

Test Methods

All road test methods for the evaluation of fuel anti-knock quality are based on the comparison of test fuels with reference fuels under operating conditions most likely to produce detonation in an engine, i.e. under full throttle operation. As will be seen later these may be under accelerating conditions on a level road, or decelerating up a steep hill. It is essential therefore, as a preliminary to any road testing, to ensure that suitable road conditions are available which will permit full throttle acceleration, and it must be possible to reproduce accelerations from one test run to another. Before tests are commenced it is essential to drive the car to be used for one hour at or as near full throttle as possible to ensure that temperature conditions of the engine are stable.

Uniontown or Knock Intensity Test Procedure (CRC Designation F-8c-943)

This method was the first one widely used in co-operative testing in the U.S.A. and in the U.K. when the current laboratory knock test procedures were developed.[3] It requires an audible comparison of the knocking characteristic of the test fuel, with bracketing reference fuels at the points of maximum knock on each during a full throttle acceleration regardless of engine speed. The fact that the fuel knocked somewhere between ten and sixty miles per hour during a test had no bearing on the rating of the fuel, i.e. the fuel was rated irrespective of the speed at which maximum knock occurred. Fig. 1 shows how these data were presented, and the method of rating the fuels is self-evident.

The test requires no special instrumentation; and for that reason it is still favoured by some laboratories. It did however require considerable skill on the part of the operators to assess knock intensity over a range from "trace" to "heavy" knock in 8 increments.

Borderline Test Procedure
(CRC Designation F-8A-943)

The method was developed in the U.S.A. between 1939 and 1941, and is particularly useful because it provides information on the variation in anti-knock quality throughout the speed range of an engine.

To make this test it is necessary that the ignition distributor automatic advance mechanism shall be rigidly locked, and provision made for the manual adjustment of spark timing from inside the car. All vehicles used for this type of test must be fitted with a means for indicating accurately the spark advance setting from inside the car whilst the car is being driven.

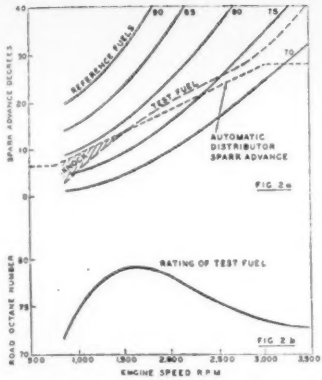

Fig. 2. Road octane numbers by Borderline method

A series of full throttle accelerations are made, each with a different spark advance, and the knock extinction speed is noted for each spark setting. Ignition settings are chosen so that each increment gives a change in knock extinction speed of about 500 r.p.m. and is usually between 2° and 5°. These data enable a borderline or limiting knock curve to be developed for each fuel. A series of curves is developed for the reference fuels as shown in Fig. 2(a) and subsequently a similar curve is developed for a test fuel. Fig. 2(b) shows how the results obtained on a test fuel can be used to determine its anti-knock quality throughout the speed range.

If the automatic ignition response for the engine in question is superimposed on the reference fuel framework it is possible to establish whether or not the test fuel will knock in that car when the ignition is normally adjusted.

These two methods both suffer from a common drawback. In making the tests the engine is permitted to detonate at very high knock intensities during part of the test. This means that the vehicle is operating under a condition which seldom occurs in average driving, and in this respect it may not truly reflect service conditions. Heavy knock intensities are also thought to affect the accuracy of ratings as combustion chamber deposits may be disturbed, and in addition, if an engine is allowed to reach high knock intensities, the conditions producing knock will be intensified and the knocking range of the fuel is liable to be extended. Because of these drawbacks these tests have been modified to avoid the use of high knock levels, the more recent methods being operated at trace knock intensity only.

Modified Uniontown Test Procedure

As its name implies this is a modified version of the Uniontown Knock Intensity test procedure already referred to. The test car is accelerated at full throttle from approximately 15 m.p.h. to 60 m.p.h. in top gear on a suitable road. The automatic spark advance mechanism, provided by the engine manufacturer, is in operation and plays a dominant role in the resultant rating. The basic spark timing is adjusted manually and set so the loudest knock occurring at any speed is of trace intensity. This basic setting is determined for primary reference fuels in increments of 2.5 octane numbers, and is plotted against octane number to give a "basic spark advance" versus "Modified Uniontown road octane number" calibration curve as in Fig. 3. When a basic spark setting is determined for a sample, the calibration curve is used to obtain the Modified Uniontown road octane number.

Although this method rates a fuel irrespective of the speed at which trace knock occurs, the critical knock speed is recorded for each fuel tested.

Modified Borderline Test Procedure
(CRC Designation F-8B-943)

This is a modification of the previous borderline method, the difference being that instead of using a fixed spark advance an over-riding hand control for the ignition is used, as well as the

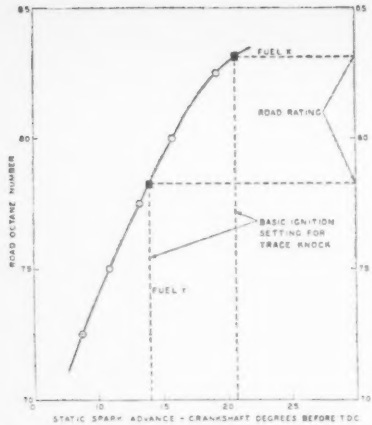

Fig. 3. Modified Uniontown reference curve

automatic mechanism provided by the engine manufacturer. During the full throttle acceleration an operator makes use of the hand control to maintain trace knock intensity. Observations are made as the engine speed rises during an acceleration, and the ignition advance required to produce trace knock at a particular engine speed is recorded and plotted in the same manner as for the Borderline procedure shown in Fig. 2(a) and 2(b). A study of the curve for a given fuel in relation to a reference fuel framework enables the test fuel to be rated throughout its speed range.

The four test techniques referred to above are used by some petroleum companies in the U.K. and are widely used in the U.S.A. by the petroleum and automotive industries. Current programmes of co-operative road tests conducted under the guidance of the Co-operative Research Council use the Modified Uniontown and the Borderline test methods for the greater part of their work, and the Modified Borderline is replacing the Borderline in many cases. There are however other methods of test used by some investigators which should be mentioned.

Per cent Knock-Free Vehicles

This method was described by Watson *et al*[4] and used by Edgar *et al*[5] in presenting data on the fuel requirements of commercial vehicles. It is based on the assumption that the Road octane number of a gasoline may be defined as the percentage *iso*-octane in normal-heptane which will give knock free operation in exactly the same per cent of cars in general as does the gasoline to be rated.

This method requires the use of a large number of vehicles, 100 or more; a series of primary reference fuel blends is tested and the only observation made is whether or not the fuel gives knock-free operation. At the same time fuels to be rated are used in the same vehicles and a similar observation made. The data so obtained are plotted as in Fig. 4[5] to give a reference curve of per cent knock-free vehicles for various primary reference fuel blends. Having already determined the percentage of cars which give knock on a particular test fuel, its road octane number can be determined directly from this reference curve.

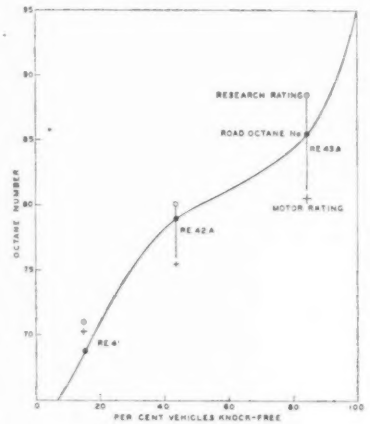

Fig. 4. Ratings of fuels in commercial vehicles in as-found condition

The sponsors of this method showed that ratings obtained agreed closely with those from the Modified Uniontown Method. Such a rating is fundamentally sound, as it is obtained from a large number of vehicles used in normal operation, and it does not require any elaborate instrumentation. There is, however, the big disadvantage that a large number of vehicles must be used, and direct comparisons of fuels in individual vehicles cannot be obtained.

A Decelerating Borderline Test

As this heading implies the technique is similar to the standard Borderline method, and has recently been described by Sprake[2]. A test course is required which has a hill of substantially constant gradient and steep enough to ensure that when approached at speeds up to 60 m.p.h. in top gear on full throttle the speed of the car is considerably reduced. The brakes of the car may be applied to reduce the speed still further if the gradient is inadequate. For this test the ignition advance mechanism is locked and a hand control is provided.

Testing of a fuel is conducted in successive stages of decreasing ignition advance. Decelerations are repeated over the test course and the speed at which knock commences is noted for each spark advance setting permitting borderline knock curves to be drawn for each reference fuel and for each test fuel. Data are thus provided which enable fuels to be rated in the same way as for the standard Borderline method as illustrated in Fig. 2, the only difference being that it is produced under decelerating instead of accelerating conditions. The main difficulty in making tests by this method is to find a suitable test route where an approach run to a steep hill can be made at speeds in excess of 60 m.p.h.

Instrumentation

The precision of the road rating procedures outlined above, with the exception of the Uniontown method and the "Per cent Knock Free Vehicles Method," depends to a great extent on the instrumentation used. In the Uniontown method of rating which requires a minimum of instrumentation and for which the vehicle is in the condition used by the owner driver, ratings are made on the basis of knock intensity assessed by a trained observer. Measurement of important engine temperatures is required only to ensure consistent operating conditions.

In the Modified Uniontown method a means is desirable, though not essential, for adjusting and accurately indicating the ignition advance whilst the vehicle is in motion. It is, however, vital to the Borderline methods, which in addition, require a calibrated road speed indicator or engine tachometer.

To meet these requirements a portable instrument panel has been developed[6] for fuel rating work. Fig. 5 shows this panel installed in a car.

It indicates spark timing in degree on a meter within $\pm 0.5^{\circ}$ and engine r.p.m. within 1 per cent, and permits the measurement of engine temperatures at five points. The spark timing meter requires a reference pulse derived from a single magnetic pick-up placed adjacent to reference pointers on the engine crankshaft, and a spark pulse initiated by the passing of the high tension spark in the engine ignition system. The tachometer only needs the reference pulse pick-up to operate it. The introduction of the instruments does not interfere with the normal operation of the engine ignition system, so long as the latter is in good condition. A selector switch is incorporated in the panel so that it can be used on four-, six- or eight-cylinder engines.

In addition to facilitating the work of fuel rating and octane requirement the instrument panel permits an accurate determination of optimum basic ignition setting on a given engine on the

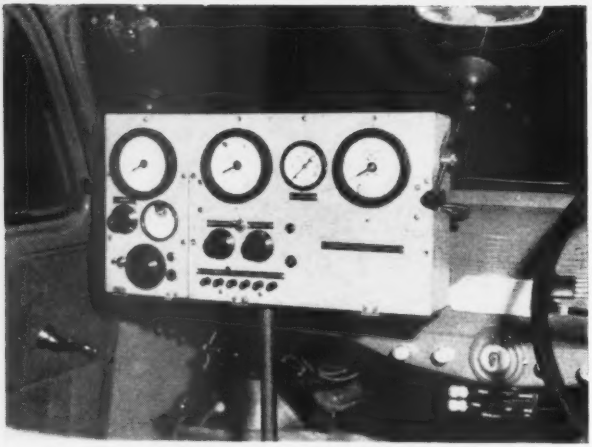

Fig. 5. Road test instrument panel

road, and a thorough investigation of the automatic ignition control mechanism response to both speed and throttle opening.

Preparation of Vehicles For Test

In addition to the provision of suitable instrumentation for this type of road testing, great care must be taken in preparing vehicles for test. Road anti-knock rating tests should not be conducted on cars which have travelled less than 2,000 miles since last being decarbonized, as carbon deposits are known to affect the ratings of fuels. The engine should be checked to ensure that all adjustments are standard according to the makers' specifications; this applies particularly to carburettors, distributors and sparking plugs.

Before testing commences an auxiliary fuel supply system must be fitted so that quick change over from one fuel to another is facilitated. This is usually achieved by connecting a flexible fuel line to the suction side of the car fuel pump, and passing this line from the engine through the bulkhead into the rear compartment of the car where the required samples of reference fuels and samples are carried in half gallon cans, see Fig. 6. The change over from one fuel to another is made by removing the fuel sampling line from one can whilst the car is driven at between 45 and 55 m.p.h., the engine is allowed to stall due to lack of fuel and the sampling line placed in the new fuel can for about 10 sec. It is again removed and the engine allowed to stall again on that fuel. The fuel line is then replaced in the new fuel and when the engine again picks up it is ready to operate on the new fuel. This procedure ensures complete protection from contamination of reference fuels or samples by one another during test.

Reference Fuels

Until as recently as 1945 secondary reference fuels were used for both laboratory and road anti-knock rating. As each batch of these was produced they had to be calibrated in terms of primary reference fuels, *iso*-octane and *n*-heptane. This was inconvenient because a considerable amount of co-operative testing was necessary for the calibration, and in addition the secondary reference fuels had different calibrations by Motor and Research methods of test in the CFR engine, so introducing further inconvenience when interpreting road test results.

These difficulties no longer exist; *iso*-octane and *n*-heptane are now produced in commercial quantities sufficient for road use and although still

expensive their cost is not prohibitive. They are used as reference fuels for both laboratory and road anti-knock ratings, the results of both types of test being given in terms of the percentage of *iso*-octane in an *iso*-octane normal heptane blend which has the same knocking characteristic as the fuel being tested in the same engine under the selected conditions of test: this percentage is referred to as its octane number.

Relationship of Laboratory to Road Ratings

Motor gasolines are tested in the laboratory by CFR engine tests known as the Motor Method (IP 44/49T) and the Research Method (IP 126/49T). The detail and significance of these tests have been dealt with by other authors,[1,2] but it is of interest to trace the relationship of these tests to the road ratings of fuels.

When the Uniontown road test method was first used in 1932 and 1934 it showed that road octane numbers, or the user opinion assessment of fuels, correlated roughly with Motor Method octane numbers. This method was the basis for quality control in the petroleum industry from then until about 1948.

During this time there has been considerable development in engine design and fuel types, one of the most significant trends in the engines being the steady increase of compression ratio. The successful operation of the General Motors 12.5:1 compression ratio experimental engine was announced in the spring of 1947 and showed the level which might possibly be reached in this respect. This, together with other design changes and changes in fuel type, has altered the knocking tendency of the average automobile engine. Engines used in the 1934 road test programme had on the average compression ratios of about 5.5:1, and combustion chamber design and valve and valve seat cooling was not up to the standard of currently produced engines. Those engines gave their critical knock in the low and medium speed range but the conditions of combustion were more severe than in current designs and it was found that in general their knocking characteristics on the road correlated roughly with the Motor Method test.

It has been observed that the average motorist assesses the quality of a fuel more on its low than its high-speed knock. This is easily understandable as knocking is much more conspicuous when it occurs at low speed during full throttle accelerations. Investigators have shown that fuels evaluated on the road by the borderline test procedure in modern engines have a marked tendency

Fig. 6. Method of supplying reference fuels in a road test car

for their Road octane numbers at high engine speeds to correlate with Motor Method octane numbers, and Road octane numbers at low speed to correlate with Research Method octane numbers. Therefore if currently produced vehicles have a predominant low speed knocking tendency, the laboratory method which reflects the customer appreciation of anti-knock performance, will be the Research Method ratings.

In 1949 the American petroleum industry changed from market quality control by Motor Method to control by Research Method. However, results of work recently published indicates that Research Method alone does not give the true indication of the probable road performance of some fuels. Watson, Caudel, and Heldman in a paper read before the SAE at Tulsa in 1948[4] gave road rating data based on current passenger vehicles which showed that their correlation of road ratings with laboratory rating could be expressed as follows:—

Road octane number (R.O.N.) = A (Research) + B(Motor) where A + B = 1.0

The data on which this was established were obtained from road tests on a variety of cars and fuels; they showed that

R.O.N. = 0.54 (Research) + 0.46 (Motor)

Some later work presented in a paper by Edgar, Gibson, Greenshields, and Pusack[5] in January 1950 dealing with the anti-knock requirements of commercial vehicles, showed that the correlation for such vehicles agreed closely with that published for passenger vehicles and they expressed the correlation of laboratory rating with road rating as

R.O.N. = 0.7 (Research) + 0.3 (Motor)

Sprake[2] has suggested that the best indication of the road octane number of a fuel is an average of its Motor Method and Research Method octane numbers.

It is apparent therefore that there is no close agreement on this subject, but in general it may be said that the road rating of a fuel will lie somewhere between Motor and Research octane numbers and if it is desirable to know the road anti-knock performance of a fuel in a given car with accuracy then road tests must be made.

When it is required to evaluate motor gasoline in terms of the user opinion of those fuels, the author believes the Modified Uniontown test procedure is the most suitable method. However when detailed information is required on the behaviour of a fuel throughout its speed range, or when the characteristics of an engine are to be investigated, then the Borderline Test Procedures are more appropriate, and these are widely used when developing fuels and engines.

The increasing use of catalytic cracking polyforming, Platforming and similar processes in the production of motor gasolines and the upward trend of engine compression ratios make it essential that road rating techniques such as those described shall be applied to ensure that engine development makes the best use of the fuels provided.

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LAUNCH OF S.T.S. "VELLETIA"

In the grey light of a late autumn afternoon in a slight drizzle of rain the launching party, many of whom had travelled from London, made their way on October 31 on to the platform at the Wallsend shipyard of Messrs Swan, Hunter, and Wigham Richardson Ltd. In front of them stood the new 28,000-ton deadweight Shell tanker *Velletia*, one of the three sister ships of the *Velutina*, launched from the same berth 18 months previously and the first super-tanker to be built in Europe.

To many it was their first sight of a ship waiting to be launched and they watched with keen interest and wonderment as men streamed out from under the enormous vessel—men who had been preparing the ship for its launch. Some wondered—would everything be all right? Why should that great mass of steel with its graceful curves and massive outline be expected to glide into the water almost at a touch?

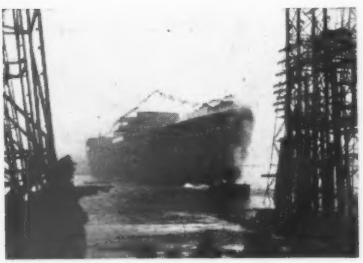
There were some who wondered for a moment on what lay behind this ceremony and speculated upon what the future might hold for the ship and her crew. On the gantries all around stood the men whose toil had made possible yet another tanker to bring vital petroleum supplies to Great Britain from overseas.

Then, the signal was given and there was a tenseness in the air as amid complete silence Mrs Frank Hopwood, the wife of the Hon. Frank Hopwood, managing director of The Anglo-Saxon Petroleum Company Ltd.—the owners, moved forward to the launching table. In traditional phrases Mrs Hopwood named *Velletia*, the silence was broken momentarily by the crash of the broken glass as the champagne bottle broke on the vessel's bows, and then quietly and serenely this great ship gracefully moved down the slipway. The silence was broken first when the restraining chains were taken up and then by the cheers of the spectators as *Velletia* entered the Tyne. For a moment she was encompassed in a cloud of steam and then, as the air cleared, there she was floating gracefully in the river.

S.T.S. Velletia

With a hull built by Messrs Swan, Hunter, and Wigham Richardson Ltd. and engines (single screw geared turbines) by the Wallsend Slipway and Engineering Co. Ltd., *Velletia* will have eleven centre, port, and starboard tanks

The Hon. Mrs Frank Hopwood about to christen S.T.S. "Velletia" and—



—the newly-launched vessel in the water
(Shell photos)

Mr Sheriton C. Swan, the Hon. Mrs Frank Hopwood, The Rt. Hon. The Earl Grey, and Mr J. W. Platt at the tea following the launch

with a total cargo capacity of about 26,000 tons at 50 cu. ft. per ton 98 per cent full. There is also one cargo hold.

Principal dimensions of the ship are:

Length between perpendiculars	610 ft
Length overall	643 ft
Depth moulded to upper deck	45 ft
Deadweight (on 34 ft draught)	28,000 tons
Gross tonnage	18,600 tons
Designed service speed	15 knots
Oil fuel bunkers	2,800 tons

Construction is in the combined transverse and longitudinal system and welding has been used for practically the whole of the steel construction. Riveting is used for connexion of side frames to shell plating and transverse beams to decks at the ends of the ship.

The Reception

Speaking at the reception following the launch and proposing the toast of "The S.T.S. *Velletia* and all who sail in her and the Anglo-Saxon Petroleum Co. Ltd.," The Rt. Hon. the Earl Grey, a director of the builders, said he had a deep feeling that never was there an occasion when their good wishes were more real and more needed when the life of our country was set about by cross currents. Oil brought light into our homes and he hoped that that would be a happy privilege of *Velletia*.

Mr Sheriton C. Swan, proposed the toast of the Hon. Mrs Frank Hopwood, and hoped that she would always be as proud of her godchild as were the builders. Many Tyneside ships bore names famous in the nautical history of Britain and *Velletia* would be among them.

He then asked Mrs Hopwood to accept a small token from the builders to mark the successful launch.

Mrs Hopwood expressed her immense pleasure and the hope that the *Velletia* would always have the best of luck.

Mr J. W. Platt, M.Inst.Pet., managing director of the Anglo-Saxon Petroleum Co., Ltd., proposing the toast of "The Shipbuilders and Engine Builders" estimated that during 1951 65 tankers of 5000 tons and over would have been launched from British yards. By the end of the year another 230 would be under construction and on order.

He expressed concern at the effect that taxation and inadequate depreciation allowances were having on the capital cost of providing the world with its rapidly increasing requirements of oil.

Pointing out that, as a result of the insistent demand, world consumption (excluding U.S.A. and U.S.S.R.) over the next 5 years is likely to rise by at least one-third, an increase of no less than 60 million tons, Mr Platt stressed that, quite apart from normal mainten-

ance and replacement costs, the extra capital which the oil industry will need in order to handle this additional quantity of oil would be well over £1200 million—£650 million for additional refinery equipment, £300 million for new tankers and a further £300 million for distribution facilities.

The British share in this part of the world's oil business is approximately 40 per cent, much of which would have to be financed out of current funds, because of inadequate depreciation allowances. Mr Platt emphasized that unless the programme is met, the world will be short of the energy it needs; furthermore, unless the British interests play their full part, the country will lose a most valuable contribution to its precarious balance of payments.

The toast was acknowledged by Mr Sheriton C. Swan.

★ ★ ★

COUNCIL COMMENTARY

At the October 10 meeting of Council E. J. Dunstan, Vice-President, was in the chair, the President being out of the country.

The composition of the various committees of Council was considered. These committees are of considerable importance and are responsible for many of the activities of the Institute.

The recommendation of vice-presidents for the year 1952/3 is under way, and there are three or possibly four vacancies to be filled. Vice-Presidents serve for three-year periods and are six in number.

Arrangements for closer co-operation between ASTM and IP are proceeding satisfactorily and it is hoped that six IP representatives will become members of ASTM Committee D2 and that six ASTM representatives will join our Standardization Committee. It was agreed that the task of ensuring close co-operation between sub-committees of Standardization Committee with their ASTM counterparts should be undertaken by the six IP members sitting on committee D2, together with the chairman and vice-chairman of the Standardization Committee acting as a special committee for this purpose.

Publications Committee have suggested that a summer meeting of the Institute be held in 1952 with a central theme—co-operation by ASTM and IP on standardization. Such a meeting would include social activities as well as the more serious activities, and a seaside resort has been recommended as a desirable setting. The question is being further explored.

Arrangements for the annual dinner are proceeding apace and consideration is being given to the speakers at this event. More of this will be heard later.

The question of awards given to students at the Imperial College of Science and Technology were raised.

It was decided that the Institute's grant should be in the form of a prize of books or should be used to enable the recipient to visit an oilfield or do other practical work, the decision to be left with the students' professors. In this manner a student would be able to reap material benefit from such an award.

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Monomeric Styrene. Forth Chemicals announce an expansion of their Grangemouth plant, now under construction, which will substantially increase their projected production of monomeric styrene. The smaller plant is expected to come into production in 1952, the extension about two years later.

AROUND THE BRANCHES

London Branch

On October 24 at Manson House, J. G. Dawson, of Thornton Aero Engine Research Centre, read a paper to the London Branch on "Aircraft Gas Turbine Fuels." By an unfortunate chance the following day happened to be the date of the General Election and this no doubt accounted for the fairly small attendance; the Chairman and Vice Chairman were also absent and in their place W. H. Davies, a member of the Committee, presided.

Mr Dawson dealt in very interesting detail with the surprisingly large number of technical considerations which affected the design of aircraft gas turbines and their fuel requirements; design factors in the aircraft itself as well as the very wide range of atmospheric conditions in which they have to operate also have a major influence on some of the characteristics needed in the fuel. Even when all these considerations have been balanced one against the other, there still remains the question of the type of fuel which the petroleum industry itself can produce most economically and in the largest quantities, bearing in mind not only peace time civil requirements but also possible wartime needs.

Mr Dawson's paper gave rise to a very lively and well-informed discussion, following which K. Hunt proposed a vote of thanks which was carried with acclamation. The usual informal dinner was held afterwards, at which the speaker was the guest of the Branch.

South Wales Branch

The first meeting of the session was held at Llandarcy on October 18, 1951, under the Chairmanship of E. S. Squire, Branch Chairman, at which a talk was given by R. J. Bressey, M.A., B.Sc., of Shell-Mex & B.P. Ltd., (Fuel Oil Department) London, entitled "About Oil Firing."

The speaker gave some very interesting statistics indicating the ever-increasing applications of fuel oil both ashore and at sea. He went on to explain in a very novel and interesting way the necessity for burning fuel oil efficiently ensuring proper atomization, demonstrating the latter process by the use of an ordinary scent spray as a burner, first showing that the flame could not be maintained without some heat retaining agent. Mr Bressey then rectified this by directing the flame through a small length of metal tube, preheated. He then discussed methods and reasons for ensuring efficient combustion and air control. In order to show further features in the development of atomization the Shell film "Atomization" was shown.

A second film entitled "A Story of Steel" (Shell-Mex & B.P. Industrial film), which had a local flavour, was then shown. This was of particular interest as it showed several different applications of fuel oil in the manufacture of enamel basins from scrap steel and also some aspects involved, in processing, in the steel and tinplate industry.

An interesting discussion followed the talk and it was pleasing to note that the iron and steel industry now appears to be quite happy about the use of oil fuel, according to opinions expressed at the meeting by many members of that industry.

At the conclusion of the meeting, a vote of thanks was proposed by D. G. Curtis of the National Oil Refineries Ltd., and was seconded by E. B. Johnson, of the Amalgamated Anthracite Company.

Scottish Branch

A meeting of the Scottish Branch held in Edinburgh on Thursday, November 1, when an address on the "Construction of a Modern Refinery" was given by W. Robb and W. M.

Greenhorn. Chairman was Robert Crichton, J.P.

The lecturer explained that as a contribution towards the British Government's policy to increase the refinery capacity in the U.K., the decision was taken some three years or so ago to instal part of this refinery expansion at the Scottish Oils, Ltd. refinery at Grangemouth.

In Stage I of this expansion project a crude oil distillation unit has been installed capable of handling 1,400,000 tons/year of crude oil, also the necessary treatment plants for refining the various semi-finished oils obtained therefrom.

The principal item of Stage II will be a catalytic cracking unit plus a vacuum distillation unit to prepare the feedstock and a catalytic polymerization plant to produce a high-octane gasoline from the light gases produced in the catalytic cracker. The main objective of the catalytic cracker plus polymerization plant is to turn low-grade fuel oil into high grade motor spirit.

One of the main features on the site is a large modern steam and power generation plant. The boiler plant consists of four boilers each capable of supplying 150,000 lb/hr of steam at a pressure of 510 p.s.i.g. and a temperature of 760° F. The power plant consists of three direct coupled pass out turbines each complete with an alternator of 6,250 kW 3,300 V 3 phase 50 cycles. The turbines are designed for pass out and condensing, the pass out pressure being 200 p.s.i.g.

Large quantities of water are required in the modern oil refinery and in this project the estimated quantity is 3.5 million gal/day which is supplied from the Grangemouth Burgh Scheme.

To cool back the 2,000,000 gal/hr of water in circulation two large concrete cooling towers are erected, each 200 ft high.

A first-class road system has been laid out, giving access to all plot areas. This involved laying 2½ miles of main road and 2½ miles of secondary roads.

A vote of thanks to the lecturers was proposed by J. G. Annan, and Mr Crichton was thanked for his services in the Chair by A. Fleming.

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NIGERIA'S FIRST DEEP TEST WELL

The first deep well to be drilled in Nigeria, West Africa, was recently "spudded-in" near Owerri, in the eastern part of the country, an "Ideal" 100 drilling rig, capable of reaching a depth of more than 10,000 feet, being used.

Exploration for oil has been carried out in this territory for some considerable time. Activities were suspended during the war, but since 1946 extensive geological exploration work has taken place over about three-quarters of the 60,000 square miles concession area.

In September 1951 a new company, the Shell-D'Arcy Petroleum Development Co. of Nigeria, was formed to conduct operations on behalf of the Shell and Anglo-Iranian organizations.

More than £1½ million has already been spent on the search for oil in Nigeria.

Owerri test well: Rotary clutch being engaged by Mrs Humphries, wife of the technical manager, Ihuo location (Shell photo)

TRINIDAD BRANCH DINNER

The Thirteenth Annual Dinner of the Trinidad Branch of the Institute was held in the Queen's Park Hotel, Port-of-Spain, on May 19, 1951. The guest of honour was His Excellency, the Governor, Sir Hubert Rance. The official guests included His Excellency Count Finbar Ryan (Archbishop of Port-of-Spain), the Right Reverend D. J. Wilson (Lord Bishop of Trinidad), the Hon. W. Savary (Speaker of the Legislative Council), the Hon. N. Tang (Minister for Health and Local Government), the Hon. V. Bryan (Minister for Agriculture and Lands) and several representatives of business and industrial interests in the Island were also present. The Police Band was in attendance.

Following the toast to His Majesty the King, His Excellency the Governor proposed the health of the Institute. In his speech Sir Hubert Rance commented on the attempts to nationalize the oil industry which were becoming evident in Persia, and suggested that some note might be taken of the example of Burma, which only produced about 40 per cent of its requirements, about 2000 barrels per day, now that the industry there was nationalized.

Continuing, His Excellency said that he was well aware that the standard of living of the Colony would fall in the absence of the oil industry, especially so in view of the increasing population. While increases could be made in the production of cocoa, coffee and sugar, the output of oil must be maintained, and increased if possible. Trinidad was a difficult geological country, and the last statistical report had shown a daily production of 56,000 barrels, with fewer wells flowing and more pumping; it would be a serious thing for the Island if this trend persisted.

After thanking, on behalf of the Government, the companies who were spending large sums in exploration, and wishing them success in their venture, His Excellency proposed the health of the Institute.

(Left to right): J. O'Connor (Secretary to the Governor); Hon. H. A. Bennett (T.P.D.); M. M. L. Parkinson (T.L.L.) (foreground); Hon. J. L. M. Mathieu-Perez (Attorney-General); J. B. Christian (T.L.L.); Major A. Clayton-Smith (foreground); Rt. Rev. D. J. Wilson (Lord Bishop of Trinidad); Hon. P. M. Renison (Colonial Secretary); Count Finbar Ryan (Archbishop of Port-of-Spain)

In his reply, the Chairman of the Branch, Mr J. L. Andrews, after thanking H.E. for his gracious speech, contrasted the youth of the Institute of Petroleum and the industry, as we know it to-day, with the antiquity of petroleum which, in its simplest form, has been used by man since the dawn of time. He drew attention to the remarkable growth of the industry and to the ever increasing trend towards specialization necessitated by technical advances. Technical qualifications of those engaged in the industry are thus becoming more and more exacting. He said that the Institute of Petroleum embraces all phases of this great industry and many of the world's eminent technicians are members of it. The Trinidad Branch, though a relatively small unit of the parent body, was proud to have been able to contribute something useful in at least one line. By their membership to the Institute, members were enabled to keep abreast of the latest technical advances from the pages of the *Journal* and the local Branch meetings gave them the opportunity of discussing and considering their own specialized problems.

Mr Andrews compared the modest production of Trinidad with that from the world's great oilfields such as the Middle East and noted that prolific oil reserves are often associated with the wilder and more desolate parts of the world. He suggested that it may be because Trinidad is so pleasant a place to live in that the average Trinidad well yields only 27 barrels per day compared with figures of the order of 10,000 barrels per day for Saudi Arabia.

He said that although Trinidad ranks low on the list of oil-producing countries, the same does not apply to the difficulties it presents to oil men and he knew of no other country in the world where so many technical problems are concentrated into so small an area. He said that Trinidad is a constant challenge to the skill and ingenuity of the oil technologists.

He mentioned the problems of high pressures at shallow depth, now happily overcome by improved drilling and mud technique, and paid tribute to the early pioneers who had persevered in the face of difficulties and disappointments to build the industry to the active and

(Left to right): W. E. Madden (U.B.O.T.); His Excellency, the Governor, Sir Hubert Rance; J. L. Andrews (U.B.O.T., Chairman of the Branch); Solicitor-General, Mr C. T. W. E. Worrell (back to camera); The Speaker of the Legislative Council, Hon. W. Savary; P. E. T. O'Connor (Antilles)

flourishing stage seen in Trinidad to-day. The major problem to-day, he said, is to find new oil reserves and this is a triple problem. First, the geologist must indicate the most likely areas to drill for oil, secondly, the oil must be reached by the drill, and thirdly, the operations must be conducted economically and profitably.

He mentioned the complex geological conditions in Trinidad and pointed out the difficulties in locating oil accumulations at depths of 10,000 feet and more, even with the aid of geophysical methods such as seismic surveys which are being carried out in the Island. The proof could only be found by drilling and vast sums were being spent by the oil companies in deep well drilling. Two wells during the year had been carried to depths below 13,000 feet which was a record for the Island and he thought that the industry deserved great credit for the courage and initiative displayed in carrying out these exploration operations, the chances of which even in more prolific oil countries such as the U.S.A. had not been rated above 1 in 10.

Turning to marine exploration in the waters off the coasts of Trinidad, Mr Andrews explained the limitations of deviated drilling from shore and said that marine exploration in deep water would be a major and extremely expensive undertaking entailing the use of special drilling barges and the construction of drilling platforms.

He was sure that the various technical difficulties could be overcome but experience elsewhere had shown that drilling costs might be 10 to 15 times as great as the cost of drilling vertical wells on land. There was no right to assume that sub-surface conditions would be simpler, or oil accumulations, if they were found, would be more prolific than those on land where development had not been simple or cheap. However, he was sure that if it could be shown that there were reasonable prospects for economic development, the industry would not shrink from taking the risk, but there were many problems both technical and economic to be solved and the industry would require all the help and encouragement possible if they were really to go to sea.

All responsible people in Trinidad, he said, are fully aware that the future of the oil industry and of the Island itself depend in no small degree on the success of these various exploration operations. He was sure that with Government's help the problems could be solved and he looked forward to the future with confidence and a lively interest for what to-morrow would bring.

"*The Guests*"

Mr W. E. Madden, General Manager of U.B.O.T., in proposing the toast to the Guests, said that it was impossible to do justice to all the distinguished guests, otherwise he would be warned by one of the most distinguished for exceeding his 45 minutes, and he did not think he would obtain a majority vote from the "House" to continue for another 45 minutes: it was therefore necessary for him to generalize. It was not by accident that the guests present represented every phase of activity and life in the Colony; they were the people with whom the oil industry came into day-to-day touch.

Mr Andrews had already said that the industry needed the assistance of everybody in the search for oil, but it was true to say that the rest of the Colony needed the assistance of the oil industry, which in the last year had made a direct contribution of 30c in every dollar of Government revenue. This was apart from the $35,000,000 put into circulation in the same year in the form of wages, salaries, and local purchases, which had been of undoubted assistance to the commerce of the Island.

Mr Madden went on to refer to the importance of the personal factor in the management of oil companies, saying that about 90 per cent of a general

manager's time was spent in keeping people happy, whilst the technical work was left to specialists—a specialist being defined as a man who learns more and more about less and less until he knows everything about nothing, whilst a general manager was defined as a man who learns less and less about more and more until he knows nothing about everything.

Returning to the guests, Mr Madden expressed his regret that all the Ministers could not be present, but welcomed very warmly those who had attended, and also the Speaker, the Hon. William Savary, whose name was coupled with the toast.

The Hon. William Savary, Speaker of the Legislative Council, in replying for the guests, said that the reply to such a toast was often difficult, as on many such occasions it was not always possible to tell who would be present, nor what the proposer of the health of the guests would say in his speech. On this occasion, however, he had been able to form some idea of what would be said, as not only was Mr Madden one of the people he had known for a long time, but he had also been able to form some idea of who the other guests would be.

Looking around he saw many from whom one would expect a cascade of oratory flowing as freely as water from some of the Colony's standpipes (laughter: a reference to the variable and sometimes non-existent rural water supply), but felt that he had been asked because someone felt it most appropriate that the newly-appointed person called the Speaker would be the best person. However, having listened to speeches from two members of the Institute, he felt that ability to speak publicly must be one of the requisites for office, and had rejected that idea.

The Hon. W. Savary said that it was really the duty of the Speaker to speak as little as possible; that this had not been the case recently was a phase which he hoped would soon pass. At least he felt the general level of ignorance was not as bad as in the case where a nominee for election under a new constitution, when reminded of his inability at public speaking, had replied that it did not worry him as the Government had appointed a Speaker for that purpose.

Continuing, he said that the guests could perhaps be divided into State, Church, Press, and a cross-section of the population. He did not feel able to express the views of all these classes, and would therefore conclude with a general expression of thanks to the Institute on behalf of the guests for inviting them to such a happy function, expressing at the same time the hope that this would not be the last occasion on which they would enjoy the pleasure.

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CATALYTIC GAS PURIFIER

A new process for the catalytic removal of oxygen from certain industrial gases, the Baker "Deoxo" system, has been for some time in use in the United States and it is now proposed to offer it to British industry.

In this system the removal of oxygen from hydrogen or from inert gases is accomplished by passing the gas over a specially prepared catalyst, which brings about combination of hydrogen and oxygen in the ratio of 2:1 by volume to form water vapour. This reaction will take place at room temperature. The resultant water vapour is carried away in the gas stream and can be removed by any standard dehydrator.

The inventor, Dr E. Rosenblatt, chief of research of Baker & Co. Inc., explained recently in London that the process would in his view be in future adaptable for the removal of oxygen from saturated hydrocarbons. In the petroleum industry it had thus far been used in connexion with Platforming and Hydroforming processes.

THE CBMPE

Mr Howard W. Page, addressing the CBMPE, and the chairman, Mr E. F. E. Howard

The Council of British Manufacturers of Petroleum Equipment held a luncheon on October 4 to mark their first Annual General Meeting since incorporation. Principal guest was Howard W. Page, director of Esso Petroleum Co. Ltd., who stressed the future for the British oil equipment industry. Due to tremendous increase in refining capacity in Europe in the last twelve years, tremendous opportunities have been provided for the British oil equipment industry, which itself has expanded greatly since the war.

Before the war, the centre of oil refining was in the United States, but the discovery and development of crude oil in that country has become more difficult and, therefore, more costly, whereas the development of crude oil in other areas, especially the Middle East, has become more and more economic. Refineries built to operate on Middle East crudes have been expanded and new ones constructed in the Eastern Hemisphere.

"With the growing demand for energy there is every reason to assume," said Mr Page, "that there will be continued expansion in the future in crude oil finding and development, in refining, in pipeline and tanker transport, in storage and distribution facilities". There was an opportunity for the British manufacturer which did not exist before the war and manufacturers have had considerable help recently owing to arrangements which American-owned companies made in conjunction with petrol derationing. A considerable amount of sterling built up in Britain was being used for the purchase of both goods and services.

There were many good reasons, said Mr Page, to believe that in many cases British equipment, with which our operators were not familiar, was every bit as good both in price and quality. It was a unique opportunity to introduce and test British equipment in operation. If this equipment proves itself, a long-term customer will be obtained by the British manufacturer.

The Council, thought Mr Page, could act as a valuable and efficient two-way channel for the flow of information and ideas between the oil industry and the manufacturers.

Introducing Mr Howard Page, Mr E. F. E. Howard, the chairman of the Council, suggested that the gathering showed the Council to be established "as an essential adjunct to the petroleum and petroleum equipment industries" and stressed that this would not have been possible without "the willing and complete co-operation of the oil companies, the British Standards Institution, and Government Departments." He added that he felt sure that the Council Members were to-day well equipped to meet the needs of the petroleum industry, provided the essential raw materials were available and also that, as the defence programme became heavier, cognizance was taken of the essential importance of the petroleum industry in Britain's economy.

The Executive Committee

At the AGM which followed the lunch, Douglas Wilson (*United Steel Companies Ltd.*), A. G. Ellison (*Yorkshire Copper Works Ltd*) and G. V. Sims (*Le Grand, Sutcliff & Gell Ltd.*) were re-elected to the Executive Committee and W. R. Beswick (*Ashmore, Benson, Pease & Co. Ltd.*) and P. D. Doulton, M.Inst. Pet. (*Matthew Hall & Co. Ltd.*) were elected as new members of the Committee. G. H. Thorne (*Dawnays Ltd.*) was re-elected as Hon. Treasurer.

P. D. Doulton

A comprehensive account of the Council's activities was presented in the "Chairman's report on the work of the Council 1950-1951" and on this the Chairman commented briefly.

Mr Douglas Wilson, vice-chairman, referred to the Mission then about to fly to Washington to visit the U.S. oil equipment industry under the auspices of O.E.E.C. It was an international Mission and the British representatives accompanying Mr Wilson were Frank Kenyon (*Wm Kenyon & Sons Ltd.*) S. C. Mackenzie (*Oil Well Engineering Co. Ltd.*), and J. Steel (*Ruston & Hornsby Ltd.*).

New Classified List

Recently the CBMPE has issued the 1951 revision of its "Classified List of British Petroleum Equipment." The new edition lists some 300 products not referred to in the 1949 edition, and there are now about 1300 main and sub-headings. Full details are given of all members of the Council and the announcement section is a veritable mine of information on British equipment. Price is £2 2s 0d and copies can be obtained from 79 Buckingham Palace Road, London, S.W.1.

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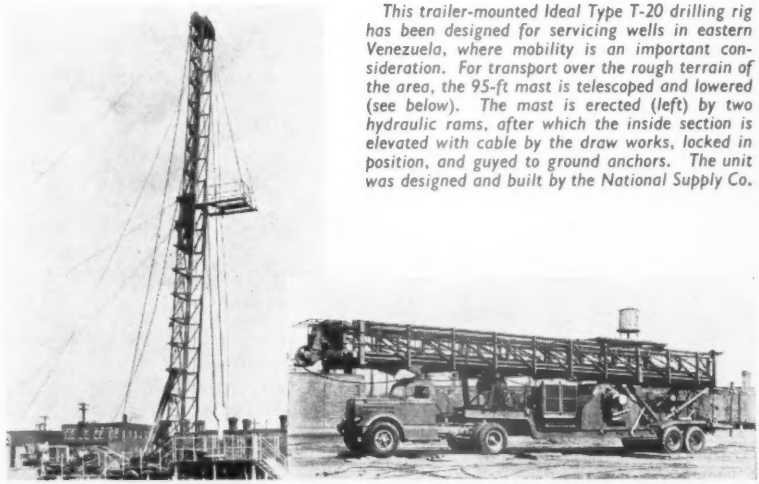
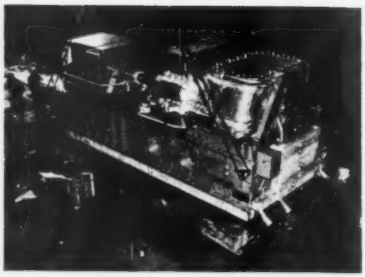


This trailer-mounted Ideal Type T-20 drilling rig has been designed for servicing wells in eastern Venezuela, where mobility is an important consideration. For transport over the rough terrain of the area, the 95-ft mast is telescoped and lowered (see below). The mast is erected (left) by two hydraulic rams, after which the inside section is elevated with cable by the draw works, locked in position, and guyed to ground anchors. The unit was designed and built by the National Supply Co.

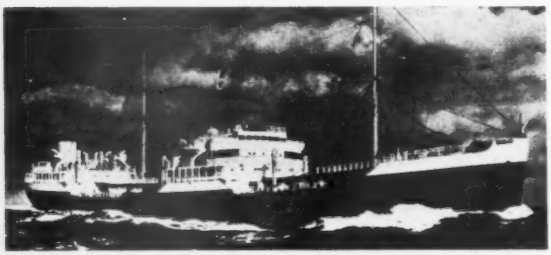
WORLD'S FIRST GAS TURBINE POWERED MERCHANT SHIP

The 12,000 ton tanker *Auris* has become the world's first merchant ship to be powered by a gas turbine. Designed as an experimental ship by John Lamb, O.B.E., head of Shell Marine Research and Development Dept., the ship when originally commissioned three years ago was fitted with four diesel-electric alternator sets.

From that time up to the middle of 1951, *Auris* operated as a normal oil tanker on the trade routes of the world. She was then moored in the Tyne, where under the supervision of Mr Lamb one of her diesel-electric alternator sets was removed and replaced by a gas turbine unit, built by British Thomson-Houston Co. at Rugby. (See *I.P. Review*, 1951, **5**, 116.)



Lifting the gas turbine, alternator and bedplate from the bogey upon arrival at the St. Peter's Works of Hawthorn Leslie & Co., Newcastle



Starboard view of D.E.S. "Auris"

After successful sea trials, lasting 48 hours, off the Northumbrian coast, *Auris* set sail without any further adjustments for PortArthur,Texas, where she loaded a full cargo of casinghead benzene.

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BENZENE PLANT AT HOUSTON

A benzene plant with a planned output of 19 million gal/year, is to be built within the existing area of Shell's Houston (Texas) refinery. The second plant of its kind to be built by the company in the U.S.A., it will also produce annually nearly 40 million gallons of toluene concentrate.

Construction of the plant is in the hands of two firms. Procon Inc., a U.O.P. subsidiary, are building the catalytic reforming unit, while the aromatic concentration section is to be constructed by Foster Wheeler.

UNDERGROUND CORROSION

Underground corrosion has been estimated to cost Great Britain £5 million per year and the importance of full and accurate records of all corrosion failures of buried pipes needs no emphasis. For this purpose a new standard record form has been prepared by the BISRA Sub-Committee on the Corrosion of Buried Metals, and incorporates changes which have been found desirable.

Copies of the form are available from E. E. White, BISRA, 140, Battersea Park Road, London, S.W.11, and it is hoped that it will be widely used.

ESSO EUROPEAN LABORATORIES
15th ANNIVERSARY

The top table at the Esso European Laboratories anniversary dinner, showing, l. to r.—D. A. C. Dewdney, F.Inst.Pet., Refinery Co-ordinator, Esso Petroleum Co. Ltd.; B. Roetheli, Manager, Contracts & Patents Dept., Esso Development Co. Ltd.; H. L. West, A.M.Inst.Pet., Manager, Development Dept., Esso Development Co. Ltd.; W. C. Asbury, Vice-President, Standard Oil Development Co.; Prof. F. H. Garner, O.B.E., F.Inst.Pet., Dept. of Chemical Engineering, Birmingham University; T. R. Bird, F.Inst.Pet., Manager, Esso European Laboratories, Esso Development Co. Ltd.; Dr W. E. J. Broom, F.Inst.Pet., Manager, Industrial Sales Dept., Esso Petroleum Co. Ltd.; J. H. Rothera, Secretary, Esso Development Co. Ltd.; E. W. Hardiman, M.Inst.Pet., Manager, Advertising and Sales Promotion Dept., Esso Petroleum Co. Ltd.

An informal dinner recently took place at the Mapleton Restaurant, London, to mark the fifteenth anniversary of the official opening of Esso European Laboratories, Vauxhall. Professor F. H. Garner, O.B.E., F.Inst.Pet., the original manager, was in the Chair and the company included members of the pre-war staff, and past and present managers of the Laboratories namely Dr W. E. J. Broom, F.Inst.Pet., Mr D. A. C. Dewdney, F.Inst.Pet., and Mr T. R. Bird, F.Inst.Pet. It was regretted that Mr C. S. Windebank, F.Inst.Pet., Managing Director, Esso Development Company Limited, and another former manager of the Laboratories, was unable to be present owing to unavoidable absence from the country.

The guest of the evening was Mr W. C. Asbury, Vice-President, Standard Oil Development Company, formerly of International Association (Petroleum Industry) Limited. Mr Asbury, together with Mr D. A. Shepard, F.Inst.Pet., and Mr W. R. Carlisle, both of whom sent greetings from New York, played an important part in the foundation of Esso European Laboratories.

In his remarks the Chairman referred to the remarkable growth of the Laboratories during the past 15 years, and briefly reviewed their activities and progress. An idea of this expansion could be gathered from the fact that the staff had increased some twelvefold during this period. Esso European Laboratories moved to Esso House, near Abingdon, in 1945, although certain testing facilities are still maintained at Vauxhall.

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"CORNISH ENGINEERS"

Issued by Messrs Holman Bros. Ltd., of Camborne, this volume by Bernard Hollowood traces and graphically describes the history of the firm's development from the time when Nicholas Holman founded a boiler works at Poole in 1801. There are a number of excellent colour plates and the 96 pages of text matter are illustrated with photographs and etchings.

PERSONAL NOTES

W. S. Robinson is this year's recipient of the Institute of Petroleum prize awarded to the best student in the Third Year Oil Technology course at the Royal School of Mines. He previously attended Morecombe Grammar School and Nottingham High School, from where in 1949 he won a scholarship tenable at the Royal School of Mines, where he is now taking his finals. He si at present Secretary of the R.S.M. Rugby Football Club and captain of the University of London Rugby Club.

Dr F. de Moura, M.Inst.Pet., chief chemist of Shell-Mex Brazil Ltd., has been elected first president of the newly-formed Associacao Brasileira de Quimica, which is an amalgamation of the Sociedade Brasileira de Quimica and the Associacao Quimica do Brazil.

The Rt. Hon. Lord Leathers of Purfleet, P.C., C.H., F.Inst.Pet., was appointed to be Minister for Co-ordinating Fuel and Power and Transport in Mr Churchill's new Government.

Leonard C. Stevens, F.Inst.P., formerly chief exploitation engineer of the Shell Caribbean Petroleum Co. in Maracaibo, is now with the Socony-Vacuum Exploration Co., Barron Building, Calgary, Alberta, as chief petroleum engineer in charge of engineering, drilling and production operations in Western Canada.

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ANNUAL DINNER, 1952

The Annual Dinner of the Institute of Petroleum will take place at Grosvenor House, Park Lane, London, W.1, on Wednesday, February 27, 1952.

Further details will be announced shortly.

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PETROLEUM INDUSTRY CHARTS

A series of ten charts covering the more important aspects of the petroleum industry is now available and should prove of value, particularly in educational circles. Titles are exploration, drilling, field development, production, land transport, transport by water, primary distillation, vacuum distillation, thermal cracking, and catalytic cracking. Each chart measures 31 × 23 inches and consists of diagrams in colour illustrating operations under the various headings which are also explained in text matter printed on the chart. The charts are obtainable from Shell-Mex & B.P. Ltd., Shell-Mex House, Strand, London, W.C.2, at 11s. 6d. per set.

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SIMA HANDBOOK

The 1951 edition of the *Directory and Handbook of the Scientific Instrument Manufacturers Association* (20 Queen Anne Street, London, W.1), has been issued. It contains information as to the sources of over 2,500 scientific instruments manufactured by members of the Association. In the Foreword, Sir Ben Lockspeiser (secretary of the DSIR) directs attention to the advantages of measurement and instrument control and says: "In a highly developed technological industry, like that of oil refining, instruments alone can account for 10 per cent of the capital outlay on plant. This is at present exceptional, but is not likely to remain so."

SHELL-B.P. MOTORING FILMS

On October 22 Shell-Mex & B.P. Ltd. held the premieres of the latest films in their Motor Sport series.

First of these was *XXIst Monte Carlo Rally* 1951 and in half-an-hour the audience were given an interesting record of the experiences of the drivers as they sped across Europe to Monte Carlo from Glasgow, Lisburn, Stockholm, Oslo, Palermo, and from Monte Carlo itself. Although the Rally has none of the thrills of a track race, there is plenty in the film to maintain interest throughout.

The second film was *Festival Logbook*, the second edition of the Cinemagazine for Motorists. This was very wide in its scope and in twenty minutes covered the Birmingham Rally of the Veteran Car Club which showed what a veteran car can do; a demonstration of the Bond Minicar; and some examples of what a motor vehicle can do under a variety of conditions—the conditions ranged from the special facilities at the MIRA Proving Ground at Lindley to the Yorkshire Sports Car Club trials in a blizzard and the Shelsley Walsh Hill Climb. Showing time was 20 minutes.

Two veterans of 1904 (No. 55) and 1900 (No. 10) going strong in the Birmingham Rally

As an additional attraction there was a 15-minute film interview with Stirling Moss, who demonstrated on the track, and in the bar with a model car, how to take a corner at speed. After the film was shown a copy was presented to Stirling Moss by Mr C. M. Vignoles, O.B.E., M.Inst.Pet., managing director of Shell-Mex & B.P. Ltd.

The bend of the bar is as good as anywhere to theorize on cornering

All these films are sound films and are available in 16 and 35 mm sizes. They can be borrowed without charge on application to Divisional Offices of Shell-Mex & B.P. Ltd.

★ ★ ★

Royal Festival Hall. The heating, ventilating and hot water services at the Royal Festival Hall are described with many illustrations by A. C. F. Mackadam in a pamphlet issued by Matthew Hall & Co. Ltd., 26-28 Dorset Square, London, N.W.1.

The Liverpool works of C. C. Wakefield & Co. Ltd., has been sold to Samuel Osborn & Co. Ltd., steel makers of Sheffield, Wakefield Group's new northern production centre being at Stanlow in Cheshire.

WORLD POWER CONFERENCE

Dr A. Parker, C.B.E., has been elected honorary secretary of the British National Committee of the World Power Conference, other officers being Sir Vincent de Ferranti, M.C., chairman, Harold Hobson, Vice-chairman, and Col. C. M. Croft, D.L., J.P., honorary treasurer.

A sectional meeting of the Conference is to be held in Rio de Janeiro during the period July–August 1954. The main subject for discussion will be the fuel and power problems of the tropical and subtropical countries.

The German Federal Public and Japan have been admitted to membership of the Conference and both have formed national committees.

The Annual Report for 1950 has been published and copies are obtainable from 201 Grand Buildings, Trafalgar Square, London, W.C.2, price 1s. 6d. post free.

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U.S. ROAD CONSTRUCTION

A valuable survey of American road research and construction is given in "Bituminous roads in North America," by Dr A. R. Lee, published as Road Research Technical Paper No. 22 (HMSO, 2s. 7½d. post free). The information is based in a 10,000-mile tour in 1949 and on visits to many laboratories. Plans for co-operation between the British Road Research Laboratory (D.S.I.R.) and American workers in regard to research into problems of adhesion and weathering are referred to.

★ ★ ★

DUKE OF EDINBURGH

H.R.H. The Duke of Edinburgh, K.G., F.R.S., has accepted the office of President of the City and Guilds of London Institute for the Advancement of Technical Education.

BRITISH-MADE SEISMIC SURVEYING APPARATUS

Important saving of dollar expenditure is being effected by the manufacture in Britain of parts for sets of seismic recording apparatus.

During the current year some 14 sets of these instruments, costing in all about £200,000, will have been completed by the Royal Dutch/Shell laboratories in Holland from parts made by British manufacturers of petroleum equipment.

Another successful enterprise in this field has been the manufacture in the U.K. of seismic recording paper, which prior to 1948 was obtainable only in the U.S. Since that date Kodak Ltd have made about 9000 rolls of this paper (worth £25,000) in the U.K. and delivered it to geophysical survey parties in various parts of the world.

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INDUSTRIAL SAFETY CONFERENCE

In May 1947 the Royal Society of the Prevention of Accidents organized a National Industrial Safety Conference at which seven papers were read and discussed. In these papers the views of a production manager on safety are expressed, and the right chain or rope to use in lifting gear is discussed, as are questions of preventive maintenance, visual propaganda, and lifting, and safety in a mine.

The papers and an abridged report of the discussions are now available in a 95-page booklet (price 10s net) from the Society at 52 Grosvenor Gardens, London, S.W.1.

Hunting Group. A new publicity office for the Hunting Group, under the charge of Y. Galitzine, has been opened at 35, Old Bond Street, London, W.1. The office includes a photographic reference library for press use, which is distinct from the commercial library of aerial views, operated by Aerofilms, Ltd., a Hunting Group company, at 29, Old Bond Street.

DRILLING IN BALUCHISTAN

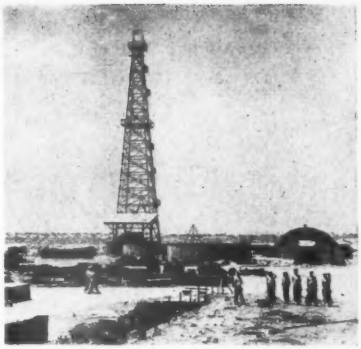
Pakistan Petroleum Ltd's first test well at Sui, Dera Bugti, in Baluchistan, on which drilling operations started on October 10, had reached a depth of 1029 ft by October 27.

Site of the well was selected after some 5000 square miles of Mari-Bugti territory had been surveyed, the prospecting area being situated at the southern end of the Sulaiman range.

Transport of stores to the project has been facilitated by the opening of a rail-head base at Kashmor. A new 35 mile road connects the well site to rail-head.

Water is supplied by means of a 40 mile 4-inch pipeline from the Indus river.

The company has also had to construct a camp for about 150 people, a power station, hospital facilities and an air-strip.



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FACTS ABOUT CANADA

A collection of useful facts about Canada for the oil and allied industries are gathered in a booklet just issued by The Canadian Bank of Commerce. Such points as exchange control, taxation, company law, leases, oil and gas conservation, customs regulations and immigration are dealt with and there is a useful synopsis and map of Western Canadian oil development.

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WORLD OIL MAP, 1950

A revised edition of P.I.B's coloured map of world crude oil production and refining capacity is now ready. Quantities of crude oil and natural gasoline produced in each country in 1950 are indicated and the intake capacity of crude oil of the refineries at the end of that year.

Copies of the map (overall measurement $39\frac{1}{2} \times 29\frac{1}{2}$ inches) can be obtained from Petroleum Information Bureau, 29 New Bond Street, London, W.1., at 2s. each post free.

U.S. FELLOWSHIPS FOR BRITISH GRADUATES

A number of Fellowships for study and travel in the U.S. are offered annually to British subjects by the Commonwealth Fund of New York. Among the six categories of Fellowship open to British men or women is the "Ordinary" Fellowship, of which 20 are available each year to graduates of a university in the U.K. or Northern Ireland. Candidates, who should not be normally resident in or near the Americas, should be between 23 and 35 years of age.

Application forms and further information may be obtained from the Warden of Harkness House, 35 Portman Square, London, W.1.

Persian Crude. Although normal crude petroleum in Persia ceased in July, there was a small production during the month of August amounting to 39,000 tons. Total production for the period January to August, 1951, was 16,176,000 tons.

FORTHCOMING MEETINGS

THE INSTITUTE

Some aspects of Field Operations in Kuwait. E. Boaden, O.B.E., B.Sc., and E. C. Masterson, B.Sc. (*Kuwait Oil Co. Ltd.*). At 26 Portland Place, London, W.1, 5.30 p.m. (*tea 5 p.m.*), January 9.

The Lubrication of Gears and the Testing of Gear Lubricants. A Symposium of papers arranged by C. G. Williams, D.Sc. (*Thornton Research Centre, "Shell" Refining & Marketing Co.*) At 26 Portland Place, London, W.1, 2.30 p.m. (*tea 5 p.m.*) February 13.

Vapour and Air Release from Aviation Fuels. L. D. Derry, E. B. Evans, Ph.D., M.Sc., B. A. Faulkner, B.Sc., and E. C. G. Jelfs, B.Sc. (*Esso Development Co. Ltd.*). At 26 Portland Place, London, W.1, 5.30 p.m. (*tea 5 p.m.*), February 25.

Fawley Branch

Annual General Meeting. At Esso Recreation Club, Holbury, 7.30 p.m., January 16.

London Branch

Bitumen and its Uses. A.B.C. Licence. At 26 Portland Place, London, W.1, 6 p.m. (*tea 5.30 p.m.*), January 22.

Northern Branch

Annual General Meeting. Technology and the Salesman. V. M. Farrant. At Engineer's Club, Albert Square, Manchester 2, 6.30 p.m., January 15.

Scottish Branch

Annual General Meeting. The Application of Gas Turbine Technique to Steam Power. At Edinburgh, January 10.

Paper by R. H. Sheldrake. At Glasgow. February 7.

South Wales Branch

Address by the President of the Institute. January 6.

Stanlow Branch

Combustion Problems of Aircraft Propulsion. S. Allen. Joint Meeting with R. Ae. Soc. At Grosvenor Hotel, Chester, 7.30 p.m., January 8.

Annual General Meeting and Brains Trust. At Grosvenor Hotel, Chester. A.G.M. 7.30 p.m., Brains Trust 8 p.m., January 16.

OTHER SOCIETIES

Llandarcy and Fuel Efficiency. R. B. Southall, Institute of Fuel. At Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 5.30 p.m. (*tea 5 p.m.*), January 15.

Oil Loading and Cargo Handling Facilities at Mina al-Ahmadi, Persian Gulf. C. W. N. McGowan, M.A., R. C. Harvey, B.Sc., and J. W. Lowdon, B.Sc. Institution of Civil Engineers. At Great George Street, London, S.W.1, 5.30 p.m., January 15.

Recent Experiences in the Lubrication of Oil Engines. L. J. Izard, Diesel Engine Users' Assoc. At Caxton Hall, London, S.W.1, 2.30 p.m., January 17.

Fuels for use in Marine Auxiliary Oil Engines. C. D. Brewer. Institution of Marine Engineers. At 85 The Minories, London, E.C.3, 5.30 p.m., February 12.

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HEAT TRANSFER DISCUSSION

A General Discussion on Heat Transfer arranged by the Institution of Mechanical Engineers and the American Society of Mechanical Engineers was held in London in September 1951 and continued in Atlantic City in November.

The ninety-three papers and the discussions thereon, shortly to be published, should form a valuable addition to the literature on the subject. Copies may be ordered at £2.5s. each from the I.M.E., Storey's Gate, St James's Park, London, S.W.1, on a special form to be obtained from the Secretary of the I.M.E.

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I.C. ENGINE KNOCK

A short symposium on internal combustion engine knock is being held by the Institution of Mechanical Engineers on Friday, February 22 at 5.30 p.m. Papers are as follows:—

Factors governing the anti-knock requirements of automobile engines. J. D. Davis.

Recent developments in "knock" research. D. Downs and R. W. Wheeler.

The significance of octane numbers in relation to road performance. H. J. Eatwell and J. G. Withers.

Members of the Institute of Petroleum will be welcome and are invited to take part in the discussion.

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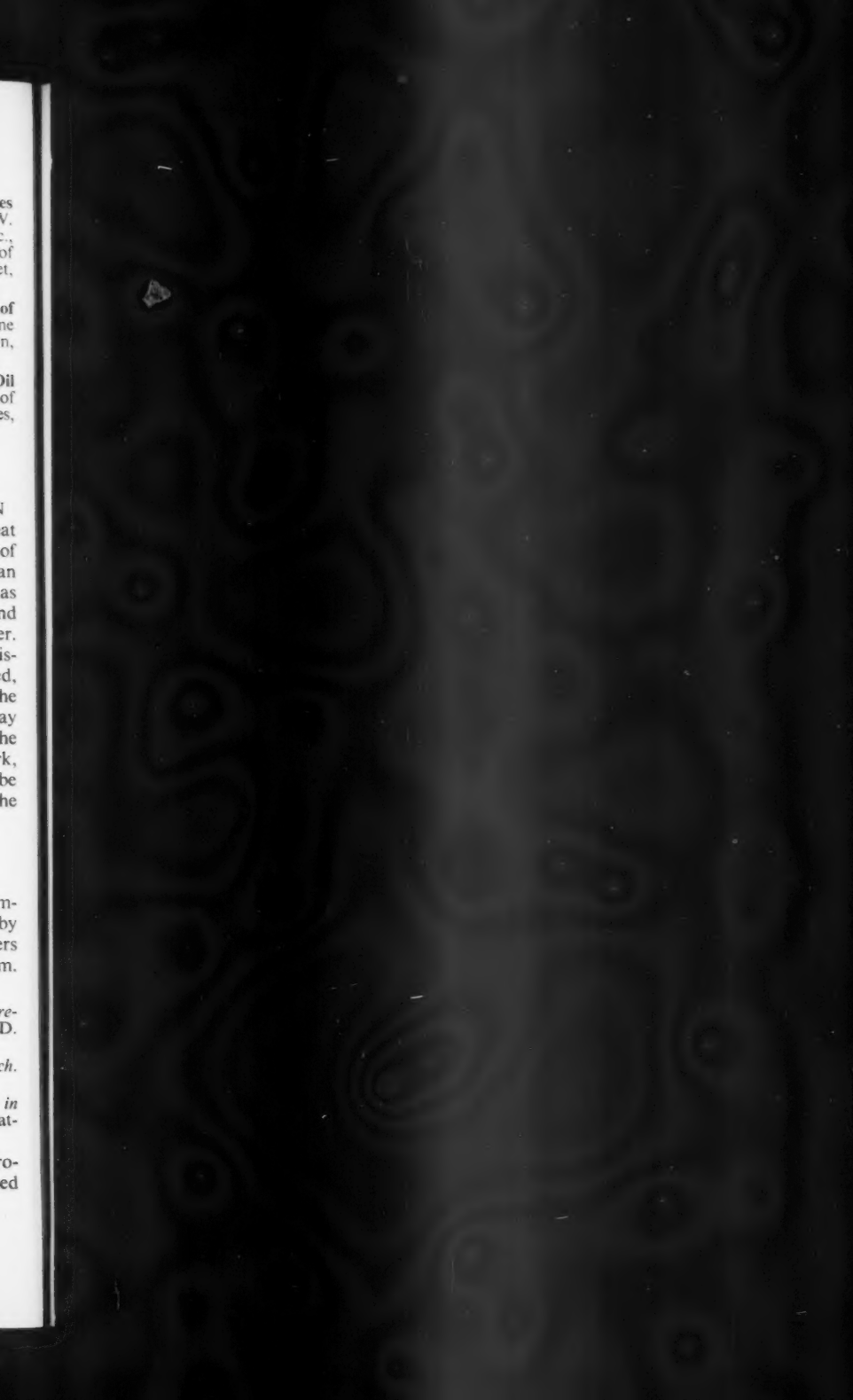

AUTHOR INDEX

ASHMORE, S. A., and VICKERY, D. S., Modern Techniques in Petroleum Testing. I. Distillation, 210, 271.

BROEZE, J. J., Oil Engine Problems and Achievements—An Oil Man's Point of View, 33.

CAWLEY, C. M., Sources of Sulphur, 177.

DABELL, A. F., Permutations and Combinations, 51

DRINKWATER, J. W., Instrument Development at Thornton Research Centre, 97

EATWELL, H. J., Modern Techniques in Petroleum Testing. V. Road Testing the Anti-knock Quality of Motor Gasolines, 421

ERROLL, F. J., Petroleum in Parliament, 73

GARRETT, K. R., Modern Techniques in Petroleum Testing. III. Gas Analysis—Other Than by Light Absorption Methods, 349

GOODFELLOW, J., Petroleum in the Paint, Plastics and Rubber Industries, 337

MALTBY, L. K., Modern Techniques in Petroleum Testing. II. Spectrometry in the Petroleum Industry, 315

MASON, J., Containers for Petroleum Products and Other Special Materials, 43

OGLE, J., and SPRAKE, C. H., Modern Techniques in Petroleum Testing. IV. Engine Tests of Aviation Fuels, 377

O'SULLIVAN, J. K., The Development of Canada's Petroleum Industry, 1.

PAGE, HOWARD W., The Future of the Oil Industry, 105.

SELL, GEORGE, U.K. Petroleum Trade in 1950, 117

SMITH, E. A., Organization and Work of the French Institute of Petroleum, 65

SPRAKE, C. H., The Progress of Laboratory and Road Knock Rating Techniques, 187. *See also* OGLE, J.

STRONG, R. E., Operational Research, 11

TYSON, J. T., Patents and Portents, 301

VICKERY, D. S., *see* ASHMORE, S. A.

SUBJECT INDEX

(*Descriptions of refineries, plant, etc., are indexed under the appropriate country.*)

Absorption spectra, standard form for, 49
Accident prevention, "good housekeeping week," 90
Africa:
  Nigeria, drilling programme, 249, 386, 433
  surveying, 386
  Uganda, geological survey, 249
Agreement for the Sale of "Know-How," 232
Analytical Chemistry Congress, 375
API Tables and Spectral Data, 163
ASTM:
  co-operation with IP, 50, 431
  fiftieth anniversary, 325

Barbados prospecting, 322
Birmingham University degrees, 325
Borneo:
  power for North, 167
  production at Seria, 111
  Sarawak, wildcats, 234
BSI Yearbook, 384
Buses, petrol, 147-51

Caribbean refining, 230
Canada:
  Alberta:
    exploration, 1, 3, 15
    new field, 240
    production, 6, 7
    refinery (Edmonton), 163
    tar sands, 7, 107, 404
  facts about, 445
  gas industry, 2, 8
  oilfields, 2-8
  pipelines, 9, 10
  Sarnia refinery, 325
CBMPE, A.G.M. and luncheon, 438–9
Coal hydrogenation, 55
Colombia, power plant for, 167
Cornish Engineers, 441
Corrosion, underground, record form, 440
Crop spraying, aerial, 166
Courses:
  instrument maintenance, 237
  liquid fuels, 50
  on oil and fats chemistry, 322
  process instrumentation, 10
  Sir John Cass College, 10, 162, 284

Denmark, storage tanks, 39
Diesels: 33-38
British exports, 222
locomotive 10100, 227
marine, 35
wear, 35, 36, 37
Directory of U.S. Companies, 76
Distillation techniques, 210-21, 271-80
Dutch To-day, 84

Ecuador, crude production, 40
Esso European Laboratories, dinner, 441

Fawley Branch, 20, 112
Films:
Diesel Story, 357
Fawley refinery film, 201
Festival Logbook, 443
Grease, 384
Monte Carlo rally, 443
new P.F.B. list, 221
Oil for the 20th Century, 358
Floating filling station, 281
France:
Institut Français du Pétrole, 65-72, 186
refining, 72
Fuel, anti-knock determination, 421-28
Fuels, aviation, engine tests, 377-83

Gas analysis, testing techniques, 349-57
Gas purifier, catalytic, 437
Gas turbine technology school, 201
Glossary of Petroleum Terms, 324

Heat transfer discussion, 202, 446
How to Write Technical Books, 85

India:
crude production, 236
petroleum products production, 236
Indonesia, power plant for, 167
Industrial Safety Conference, 444
Institute of Petroleum:
Annual Dinner, 129-45
"Archie," 229
Birmingham Students Dinner, 154-6
Brochure, 165
Council and Officers, 1951-2, 185-6
Council Commentary, 17, 41, 111, 145, 250
Electrical Code, 42
Redwood Lecture, 373-5
Session 1951-2, 322
Instrument development, 97-104
International Petroleum Council, 198
Iraq Petroleum, 386
Iraq pipeline, 17
I Sing in the Wilderness, 233

Kuwait:
crude production, 16, 50, 89, 166, 229, 323, 286
gravity fenders at, 81
students in U.K., 146

London Branch, 20, 47, 82, 112, 157, 223, 358, 385, 432
Lubricants, pooling of U.S/British tests, 114, 156, 198

Middle East:
crude developments, 105
locust control, 230
Motor fuels, evaluation, 187-94

Netherlands, Pernis refinery, 348
Northern Branch, 113

Oil and Petroleum Yearbook, 403
Olefins, catalytic polymerization, 87
Operational research, 11-16, 227

Paint industry, petroleum uses in, 337-40
Pakistan:
Chakwal test well, 235
Dera Bugti test, 445
first test well, 146
Papua, New Guinea, exploration, 386
Patents, history and development, 301-13
Persia:
Abadan cat cracker, 197
crude production, 16, 169, 229, 284, 323, 286, 445
Naft Safid fire, 250
oil agreement, 114, 156
Petroleum industry, annual expenditure, 247
Petroleum Industry Exhibition, 87, 160-1, 360
Petroleum Law, 80
Petroleum products, containers for, 43-6
Petroleum Technology, 1948, 200
Pipelines:
Burma (wartime), 134-5
Canadian, 9, 10
Finnart, 54, 109
Iceland's submarine, 168

Pipelines, *cont.*:
"Tapline," 56
U.S. mileage, 18
Plastics industry, petroleum uses in, 340-2

Radio-isotope instruments, 24
Rubber industry, petroleum uses in, 342-4

Scottish Branch, 21, 47, 157, 386, 432
Sicily, surveying, 386
SIMA Handbook, 442
South Africa, gasoline from coal synthesis plant, 145
South Wales Branch, 48, 83, 113, 224, 432
Spain, oil shale deposits and production, 285
Spectrometry in petroleum industry, 315-20
Stanlow Branch, 48, 225
Syria, concession abandoned, 159
Sulphur:
consumption, U.K., 178
Fawley plant projected, 285
production, 179-81
sources, 177-84
Surveying apparatus, seismic, 444

Tankers:
Auris, 116, 440
British Adventure, 444
British 1951 programme, 430-1
Butania II, 358
Esso's £7,500,000 order, 230
Labiosa, 345
photo exhibition, 231
new, 83, 108
Shell programme, 226
Tank Empress, 109
tonnage in 1900 and 1951, 139
Velletia launched, 429-30
Tinplate Handbook, 121
Town gas from petroleum, 18
Trinidad:
crude production, 40, 89, 104, 169, 229, 284, 323, 386
drilling problems, 435-6
exploration, 386
Trinidad Branch Dinner, 434-5

United Kingdom:
B.I.F., 196
Barton lubricants plant opened, 384
bitumen, increased prices, 199
Caltex refinery, 282
carbon black expansion, 236
Coryton refinery, 24
crude imports, 1950, 117-20, 198
Eastham, Cheshire, dock, 19
Fawley refinery, 201, 282, 387-98
United Kingdom, *cont.*:
Festival of Britain, 40, 195-6
Finnart pipeline, 54, 109
Formby drilling, 386
Grangemouth refinery, capacity, 432-3
Isle of Grain refinery, 357
Llandarcy refinery, 199
motor fuel consumption, 282
motor spirit, consumption, 114
motor spirit, increased prices, 165
Nottinghamshire production, 386
oil equipment exports, 59
petroleum products consumption, 115, 184, 234
petroleum products, new prices, 165
refined products output, 77, 234
refining developments, 79-80
refining expansion, 161
refining industry, labour statistics, 168
refining trade, 313
Shell Haven refinery, 23
standardization of naval fuel, 115
T.E.L. exports, 121
Thames estuary oil jetty, 170
trade in 1950, 117-120
U.K. Petroleum Statistics, 27
United States:
Barber refinery, N.J., 321
benzene plant at Houston, 440
crude production (California), 40, 104, 169, 284
crude production, 1950, 228
pipelines, mileage, 18
refined products, 1950 demand, 228
refineries, 24
refining statistics, 1950, 228
U.S.S.R., British fuel oil purchases from, 198

Vacuum, 164
Venezuela:
Cardon refinery, 200
crude production, 40, 89, 104, 169, 229, 284, 323
drilling rig, trailer-mounted, 439
power plant for oilfields, 167
turbo alternator for, 115

Weights and measures legislation, 346-8
World:
bunker deliveries, 401-2
crude production, 1950, 139
crude supply and demand, 399-400
crude reserves, 228
domestic demands, 402-3
oil map, 445
production ownership, 376
refined products, production, 400-1
World Petroleum Congress, 24, 58, 83, 110, 146, 251-69
World Power Conference, 24, 444

"BRITISH ADVENTURE" TRIALS

The S.S. British Adventure, first of six 28,000-ton tankers ordered by British Tanker Co., recently underwent trials in the Firth of Clyde. Five more tankers of this size are being built for the company, a subsidiary of Anglo-Iranian, and there are six even larger ships, of 32,000 tons each, on order.

A substantial number of the 150 deep-sea tankers now at the disposal of the British Tanker Co., carry Marconi Marine radio equipment, and this equipment has also been ordered for tankers not yet completed. An example is the 28,000 ton *British Bulldog*, now fitting out at Wallsend.

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RoSPA—A 12-page booklet describing the services to industry offered by the Industrial Safety Division of the Royal Society for the Prevention of Accidents is available from the Society at 52 Grosvenor Gardens, London, S.W.1.

Aromatic Solvents for Paints: The properties of aromatic solvents for use in paints are set out in Technical Service Leaflet No 3 recently issued by Petrochemicals Ltd. Copies are available from 44a Dover Street, London, W.1.

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APPOINTMENTS VACANT

Esso Petroleum Company Limited have the following supervisory vacancies in the Technical Department at Fawley Refinery near Southampton.

Candidates should have a good scientific degree, preferably in Chemical Engineering, and should have at least five years' experience of work carried out at a supervisory level in the petroleum industry.

Process Engineer to head Lubricating Oils Section. Experience is required in the design and operating problems of lubricating oil processing plant.

Process Engineer to head Planning Section. Experience is required in overall refinery planning, with a sound knowledge of refinery operations and a good appreciation of plant limitations.

All the above posts are pensionable. Applications with full details of age, experience and salary requirements, should be sent to the Employee Relations Superintendent, Esso Petroleum Company Ltd., Fawley, Southampton.

Fuel technologist required by petroleum refinery in North West England. Applicants must have good Academic qualifications in applied chemistry or industrial experience as fuel economy officer. Successful applicant will be directly responsible to Management for technical efficiency of fuel and power distribution and utilization methods, and will be required to co-operate with producing and consuming departments to achieve maximum overall thermal efficiency and lowest cost for fuel (oil) and power (electricity). Commencing salary £600-£800 per annum, dependent on qualifications. Non-contributory assurance scheme in operation. Apply Box No 1063.

Safety Officer required by petroleum refinery in North West England. Successful applicant will be directly responsible to Management for upkeep of safety records for all plant and equipment, institution and operation of safe practice routines in operation, and maintenance and technical advice to Safety Committee. Experience in similar capacity or wide knowledge of legal requirements, industrial safety codes and heavy chemical engineering practice essential. Commencing salary £600-£800 per annum, dependent on qualifications. Non-contributory assurance scheme in operation. Apply Box No 1064.

Trinidad Leaseholds Limited have vacancies for **Chemists** in their Research Laboratories in Trinidad. Applicants should be University Graduates with Physical or Organic Chemistry as a field of specialization and with a number of years experience in Petroleum or Allied Research, either Academic or Industrial. The minimum salary will be £800 per year with marriage and family allowance in addition. Apply with full particulars to the Personnel Officer, Trinidad Leaseholds Limited, Old Burlington Street, London, W.1.

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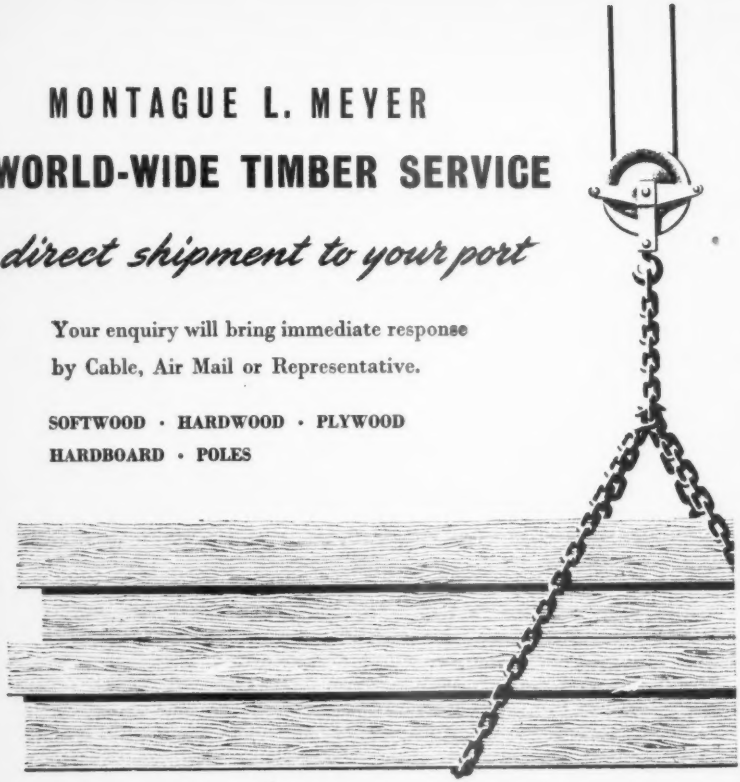

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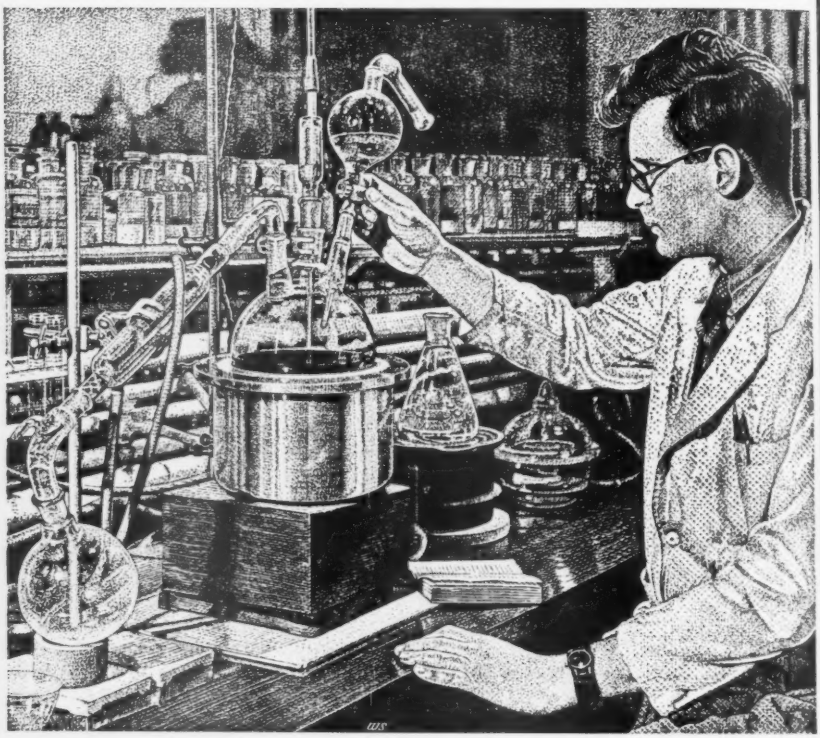

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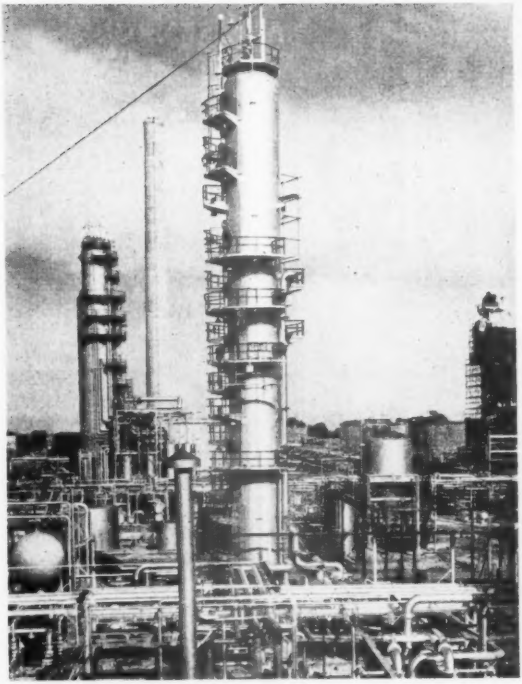

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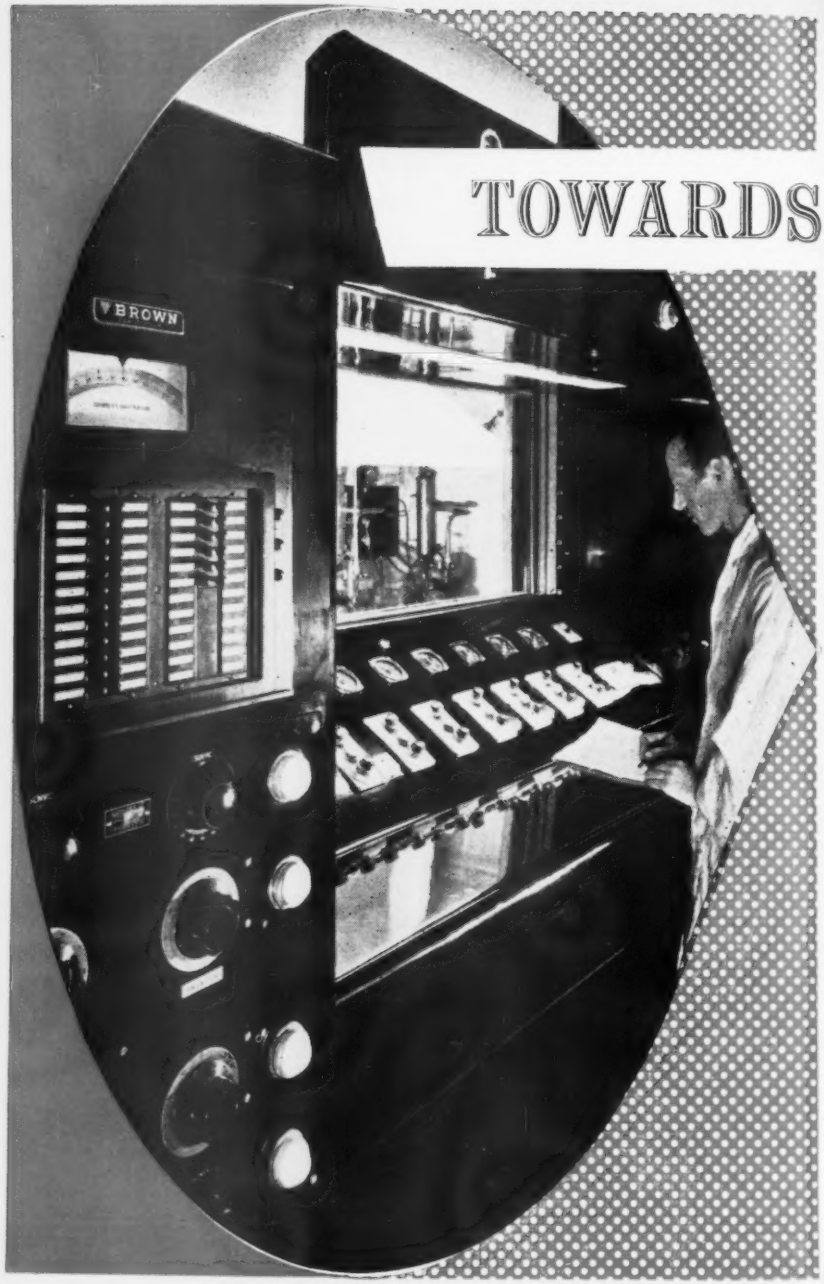
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